Quality for Life

greater WELLINGTON REGIONAL COUNCIL | Environment

Mangatarere Stream catchment water quality investigation

In July 2010 Greater Wellington published a report on an investigation into water quality in the Mangatarere Stream catchment near Carterton. This leaflet summarises that report, which can be read online at **www.gw.govt.nz/technical-reports**

Why did we investigate water quality in the Mangatarere catchment?

The Mangatarere is a large rural stream in central Wairarapa with significant management issues. While the headwaters of the Mangatarere are pristine and have significant fish values and the river into which it discharges (the Waiohine) has very good water quality, the middle and lower reaches of the stream have poor water quality. This is because this part of the catchment experiences the cumulative effects of water abstraction, intensive farming, and the discharge of treated municipal wastewater from Carterton township.

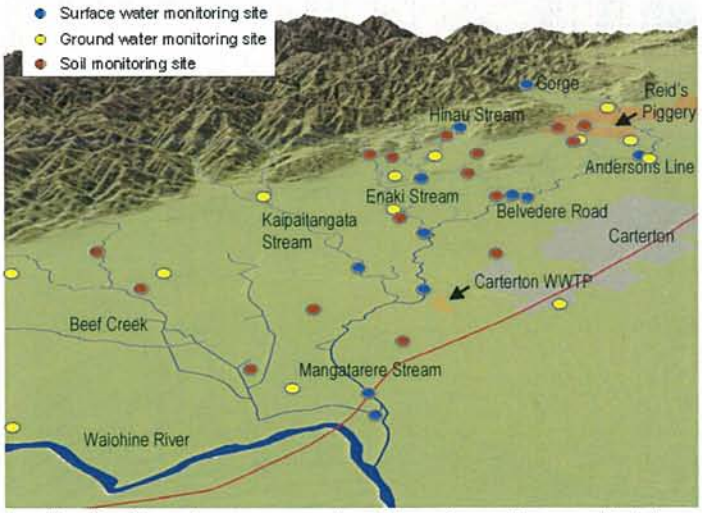
Routine monitoring by Greater Wellington has consistently shown that nutrient concentrations in the stream are high on both a regional and national scale. Understanding the problem and causes of this poor water quality is vital before we can take steps towards improving the health of the stream.

The mid reaches of the Mangatarere Stream at Andersons Line

What did the investigation involve?

Greater Wellington spent 13 months on an intensive environmental monitoring programme and also reviewed long-term water quality and resource consent data from within the Mangatarere catchment.

The monitoring programme, carried out in 2008 and 2009, involved monthly water sampling at 11 stream sites and two-monthly sampling of 13 groundwater bores. The water samples were tested for a range of variables such as suspended sediment, nutrients, *E. coli* bacteria and metals. Algae and invertebrate (eg, insects and snails) samples were also collected to provide an indicator of the stream's ecological health. In addition, soil samples were taken from 16 locations under different land uses and tested for organic material, nutrients, fertility and trace elements. The purpose of the soil and groundwater sampling was to help pinpoint contaminant sources.



Sampling sites. Stream flow was measured each time water samples were collected.
(Base map designed by Geographx)

What did we find?

The state of water quality in the Mangatarere Stream

Measuring flow in the lower Kaipaitangata Stream – note the cattle beast in the background with access to the stream

Water quality is excellent at the Mangatarere Gorge but gradually gets worse below this point as the stream flows across the intensively farmed plains. The stream water has increasingly high concentrations of dissolved nutrients and *E. coli* bacteria and, at some sites, reduced water clarity, elevated water temperatures and nuisance algal growth. Aquatic invertebrate health also declines with distance down the Mangatarere Stream.

Site-specific impacts were identified, particularly in parts of the Enaki Stream and Beef Creek subcatchments. These included compacted soils – which can promote overland flow of effluent into streams and drains – and stock access to waterways, resulting in significant water quality impacts. There was also a lack of flow in some stream reaches during summer. While this can occur naturally, it is made worse by the taking of water from streams and shallow bores for irrigation.

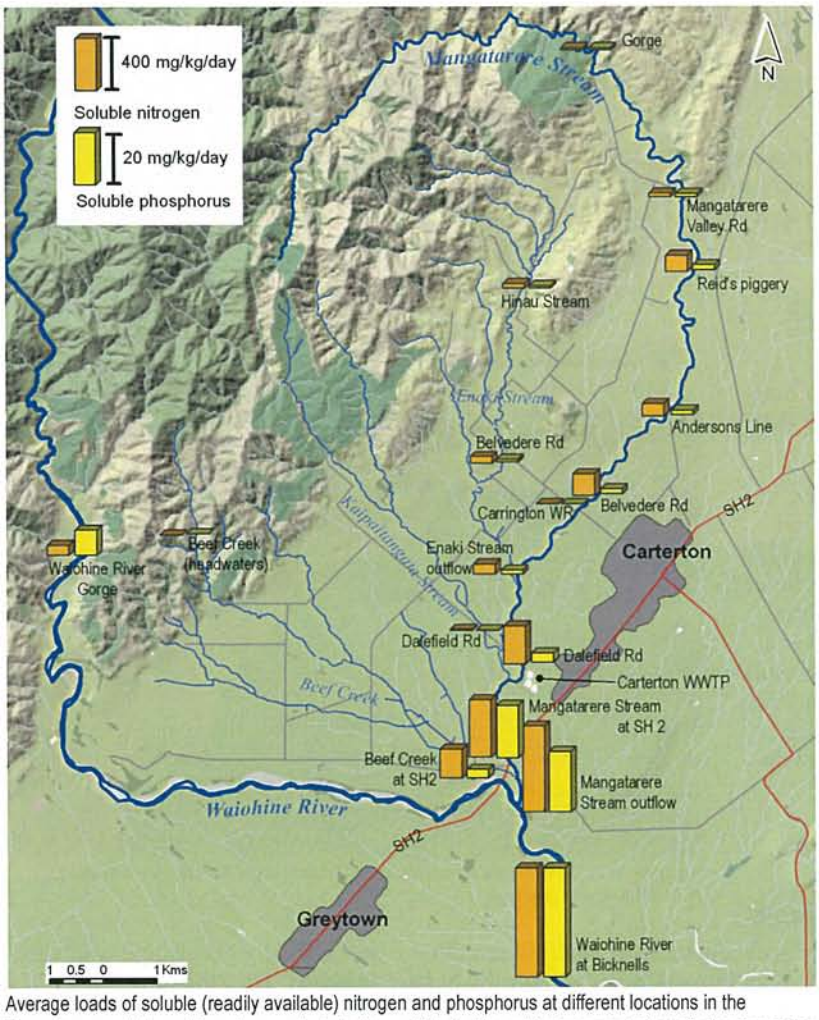
Has water quality been getting better or worse?

Long-term data shows that since 2003 water quality has changed. There has been an improvement in stream water temperature, *E. coli* counts, and in water clarity. However, this is countered by significant increases in the concentrations of phosphorus and ammoniacal nitrogen and a decline in stream invertebrate health. This tells us that, overall, water quality in the lower reaches of the Mangatarere Stream has declined since 2003.

Nutrient sources

The total amount or 'load' of nutrients – in particular soluble (available) nitrogen and phosphorus – in the Mangatarere Stream increases downstream from the gorge. While nitrogen loads increase steadily as the stream travels across the plains, phosphorus loads only increase significantly in the lower reaches of the stream below the discharge from the Carterton wastewater treatment plant. Monitoring by Carterton District Council confirms that the wastewater discharge has a measureable impact on stream health.

Beef Creek contributes relatively large loads of nitrogen and phosphorus to the lower reaches of the Mangatarere Stream. It is estimated that one-third of the nitrogen load in the Mangatarere Stream (as it enters the Waiohine River) comes from Beef Creek. The Beef Creek subcatchment comprises both dairying and drystock farming, highlighting the impact intensive agriculture can have on water quality. These impacts can occur through both surface runoff of dairyshed effluent and fertilisers, and effluent and fertilisers leaching through the soil to enter shallow groundwater systems that are connected to streams.



Average loads of soluble (readily available) nitrogen and phosphorus at different locations in the Mangatarere catchment. Loads are calculated by multiplying the nutrient concentrations in the stream by stream flow. The height of each coloured bar is proportional to the nutrient load present.

The lower reaches of the Enaki Stream reduced to a few pools in February 2009

Dairy cows in the Enaki Stream

The application of piggery effluent onto land in the mid reaches of the Mangatarere catchment was found to be having a measureable impact on soil, groundwater and stream water quality. In particular, the activity has resulted in elevated nitrogen concentrations in groundwater. This groundwater then receives further nitrogen inputs from dairy farming in the mid catchment before entering the Mangatarere Stream downstream of Andersons Line. When it rains other diffuse sources, including runoff from pasture, contribute the majority of the nutrient loading.

The results of the investigation clearly show that there is a need to manage both point and diffuse sources of nitrogen and phosphorus in the catchment.

What next?

Addressing the causes of water quality degradation highlighted by this study will require a cooperative effort. Greater Wellington would like to establish joint initiatives with iwi, landowners, industry groups and the wider community to address water quality issues. Options include riparian rehabilitation (already occurring and benefiting aquatic life in the lower Enaki Stream), bridged stock and vehicle stream crossings, stock exclusion from streams and deferred storage for dairyshed effluent. We will consider these options during the development of our new regional plan where the balance between rules, incentives and voluntary approaches to land management will be explored with the community to best find solutions to managing land use effects on water quality.

For more information, contact Greater Wellington:

Wellington office
PO Box 11646
Manners Street
Wellington 6142
T 04 384 5708
F 04 385 6960

Masterton office
PO Box 41
Masterton 5840
T 06 378 2484
F 06 378 2146

Email:
environmentalscience@
gw.govt.nz

GW/EMI-G-10/128
Date July 2010

www.gw.govt.nz